

**Chapter Four****RURAL HIGHWAYS AND ROADS  
(New Construction/Major Reconstruction)****Table of Contents**

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## Chapter Four

# RURAL HIGHWAYS AND ROADS

### (New Construction/Major Reconstruction)

This chapter presents the Department's criteria for the design of rural highways and roads. They apply to new construction and major reconstruction projects. The designer should consider the following in the use of the figures:

1. Functional/Design Classification. The selection of design values for new construction and major reconstruction depends on the functional and design classification of the highway facility. This is discussed in Section 6-1.0. For non-freeways, the design classification is based on the average number of access points per mile per side. The designer should realize that the values in the figures are for guidance only; they should not be used as rigid criteria for determining the design classification on rural highways. Each project should be designed as part of the total environment, specifically designed to fit into the context of the area where it is to be constructed. Before selecting design values, the designer should take into consideration the community, land use, visual, historical and natural resources of the area. Designers should attempt to maintain the character of an area, but at the same time meet the transportation needs of the project.
2. Capacity Analyses. Section 6-3.0 discusses highway capacity. Several highway design elements (e.g., the number of travel lanes) will be determined in part by the capacity analysis. As discussed in Section 6-3.0, the capacity analysis will be based on:
  - a. the design hourly volume (DHV), usually 20 years from the construction completion date;
  - b. the level of service, as determined from the figures in this chapter; and
  - c. the capacity analysis, using the techniques in the HCM.
3. Cross Section Elements. The designer should realize that some of the cross section elements included in a figure (e.g., median width) are not automatically warranted in the project design. The values in the figures will only apply after the decision has been made to include the element in the highway cross section.
4. Manual Section References. These figures are intended to provide a concise listing of design values for easy use. However, the designer should review the *Manual* section references for greater insight into the design elements.

**Figure 4A**  
**RURAL FREEWAYS**  
**New Construction/Major Reconstruction**

Design Element		*	Manual Section	Design Values
Design Controls	Design Forecast Year		6-3.02	20 Years
	Design Speed	x	6-2.02	70 mph
	Control of Access		6-4.0	Full Control
	Level of Service		6-3.0	B – C
Cross Section Elements	Lane Width	x	10-1.01	12'
	Shoulder Width (1)	Right	x	10'
		Left — 4 Lanes	x	8' (4' Paved + 4' Graded)
		Left — 6+ Lanes	x	10'
	Typical Cross Slope	Travel Lane	x	1.5 – 2.0% for lanes adjacent to crown; 2.0% for lanes away from crown
		Shoulder	x	4%; with CMB, 4% – 6% for left shoulder
	Median Width (includes left shoulders)		10-3.0	See Figure 4I – 100'
	Bridge Width/Cross Slope	x	10-4.01	Meet Approach Roadway Width and Cross Slope
	Underpass Width		10-4.02	Meet Approach Roadway Width Plus Clear Zones
	Right-of-Way Width		10-5.0	Desirable: 100' Beyond Edge of Traveled Way
	Roadside Clear Zones	x	13-2.0	See Section 13-2.0
	Fill/Cut Slopes		10-2.02	See Figure 4F

\* Controlling design criteria (see Section 6-6.0).

**Footnote:**

(1) Shoulder Width. Where the truck volumes exceed 250 DDHV, both the right and left shoulders should be 12 ft.

**Figure 4A (Continued)**  
**RURAL FREEWAYS**  
**New Construction/Major Reconstruction**

Design Element		*	Manual Section	Design Values (Based on Design Speed)
				70 mph
Alignment Elements	Stopping Sight Distance	x	7-1.0	730'
	Decision Sight Distance	Maneuver	7-2.0	1105'
		Stop		780'
	Minimum Radius (e = 6.0%)	x	8-2.02	2050'
	Superelevation	e <sub>max</sub>	8-2.02	6.0%
		Rate		See Figure 8-2A
	Horizontal Sight Distance		8-2.04	See Section 8-2.04
	Maximum Grade	x	9-2.03	4%
	Minimum Grade		9-2.03	0.5%
	Vertical Curvature (K-Value)	Crest	9-3.02	247
		Sag	9-3.03	181
	Minimum Vertical Clearance: Freeway Under ...	New Highway Bridge	9-4.0	16'-3"
		Existing Highway Bridge		16'-0"
		Pedestrian Bridge/ Overhead Sign		18'-0"
	Minimum Vertical Clearance (Freeway over Railroad)	x	9-4.0	23'-0"

\* Controlling design criteria (see Section 6-6.0).

**Figure 4B**  
**MULTI-LANE RURAL ARTERIALS**  
**New Construction/Major Reconstruction**

Design Element			*	Manual Section	Design Values (by Type of Roadside Development)		
					Open	Moderate Density	High Density
Design Controls	Typical Number of Access Points/Mile/Side			6-1.03	0 – 15	15 – 30	>30
	Design Forecast Year			6-3.02	20 Years	20 Years	20 Years
	Design Speed		x	6-2.02	50 – 60 mph	50 – 55 mph	50 – 55 mph
	Control of Access			6-4.0	Partial/Control by Regulation	Control by Regulation	Control by Regulation
	Level of Service			6-3.0	B – C	B – C	B – C
Cross Section Elements	Travel Lane Width		x	10-1.01	12'	12'	12'
	Shoulder Width	Right	x	10-1.02	4' – 8'	4' – 8'	4' – 8'
		Left	x		4' – 8'	4' – 8'	4' – 8'
	Typical Cross Slope	Travel Lane	x	10-1.01	1.5 – 2.0% for lanes adjacent to crown; 2.0% for lanes away from crown		
		Shoulder	x	10-1.02	4%	4%	Uncurbed: 4% Curbed: 6%
	Turn Lanes	Lane Width	x	10-1.03	12'	12'	11' – 12'
		Shoulder Width	x		2' – 4'		
	Median Width (Includes Left Shoulders)	Depressed		10-3.0	50' – 90'	50' – 90'	N/A
		Raised Island (V = 50 mph)			N/A	N/A	8' – 20'
	Bicycle Lane	Width		15-4.0	5' or Shoulder Width, whichever is greater		
		Cross Slope			2%		
	Bridge Width/Cross Slope		x	10-4.01	Meet Approach Roadway Width and Cross Slope		Sidewalk Width: 5'-6"
	Underpass Width			10-4.02	Meet Approach Roadway Width Plus Clear Zones		
	Right-of-Way Width			10-5.0	Project-by-Project Basis		
	Roadside Clear Zones		x	13-2.0	See Section 13-2.0		
	Fill/Cut Slopes			10-2.02	See Figure 4G		

\* Controlling design criteria (see Section 6-6.0).

**Figure 4B (Continued)**  
**MULTI-LANE RURAL ARTERIALS**  
**New Construction/Major Reconstruction**

Design Element			*	Manual Section	Design Values (Based on Design Speed)		
					60 mph	55 mph	50 mph
Alignment Elements	Stopping Sight Distance		x	7-1.0	570'	495'	425'
	Decision Sight Distance	Maneuver		7-2.0	990'	865'	750'
		Stop			695'	535'	465'
	Minimum Radius (e = 6.0%)		x	8-2.02	1340'	1065'	840'
	Superelevation	e <sub>max</sub>		8-2.02	6.0%	6.0%	6.0%
		Rate	x		See Figure 8-2A		
	Horizontal Sight Distance			8-2.04	See Section 8-2.04		
	Maximum Grade		x	9-2.03	4%	5%	5%
	Minimum Grade			9-2.03	0.5%		
	Vertical Curvature (K-Value)	Crest		9-3.02	151	114	84
		Sag		9-3.03	136	115	96
	Minimum Vertical Clearance: Arterial Under ...	New Highway Bridge	x	9-4.0	16'-3"		
Existing Highway Bridge		x	14'-3"				
Pedestrian Bridge Overhead Sign		x	18'-0"				
Minimum Vertical Clearance (Arterial over Railroad)		x	9-4.0	Electrified: 22'-6" All Others: 20'-6"			

\* Controlling design criteria (see Section 6-6.0).

**Figure 4C**  
**TWO-LANE RURAL ARTERIALS**  
**New Construction/Major Reconstruction**

Design Element			*	Manual Section	Design Values (by Type of Roadside Development)		
					Open	Moderate Density	High Density
Design Controls	Typical Number of Access Points/Mile/Side			6-1.03	0 – 15	15 – 30	>30
	Design Forecast Year			6-3.02	20 Years	20 Years	20 Years
	Design Speed		x	6-2.02	50 – 60 mph	50 – 55 mph	45 – 50 mph
	Control of Access			6-4.0	Partial/Control by Regulation	Control by Regulation	Control by Regulation
	Level of Service			6-3.0	B – C	B – C	B – C
Cross Section Elements	Travel Lane Width		x	10-1.01	12’	12’	12’
	Shoulder Width		x	10-1.02	4’ – 8’	4’ – 8’	4’ – 8’
	Typical Cross Slope	Travel Lane	x	10-1.01	1.5 – 2.0%	1.5 – 2.0%	1.5 – 2.0%
		Shoulder	x	10-1.02	4%	4%	Uncurbed: 4% Curbed: 6%
	Turn Lanes	Lane Width	x	10-1.03	12’	12’	11’ – 12’
		Shoulder Width	x		2’ – 4’		
	Bicycle Lane	Width		15-4.0	5’ or Shoulder Width, whichever is greater		
		Cross Slope			2%		
	Bridge Width/Cross Slope		x	10-4.01	Meet Approach Roadway Width and Cross Slope		Sidewalk Width: 5’-6”
	Underpass Width			10-4.02	Meet Approach Roadway Width Plus Clear Zones		
	Right-of-Way Width			10-5.0	Project-by-Project Basis		
	Roadside Clear Zones		x	13-2.0	See Section 13-2.0		
	Fill/Cut Slopes			10-2.02	See Figure 4G		

\* Controlling design criteria (see Section 6-6.0).



**Figure 4C (Continued)**  
**TWO-LANE RURAL ARTERIALS**  
**New Construction/Major Reconstruction**

Design Element			*	Manual Section	Design Values (Based on Design Speed)			
					60 mph	55 mph	50 mph	45 mph
Alignment Elements	Stopping Sight Distance		x	7-1.0	570'	495'	425'	360'
	Decision Sight Distance	Maneuver		7-2.0	990'	865'	750'	675'
		Stop			610'	535'	465'	395'
	Minimum Radius (e = 6.0%)		x	8-2.02	1340'	1065'	840'	665'
	Superelevation	e <sub>max</sub>		8-2.02	6.0%	6.0%	6.0%	6.0%
		Rate	x		See Figure 8-2A			
	Horizontal Sight Distance			8-2.04	See Section 8-2.04			
	Maximum Grade		x	9-2.03	4%	5%	5%	6%
	Minimum Grade			9-2.03	0.5%			
	Vertical Curvature (K-Value)	Crest		9-3.02	151	114	84	61
		Sag		9-3.03	136	115	96	79
	Minimum Vertical Clearance: Arterial Under ...	New Highway Bridge	x	9-4.0	16'-3"			
Existing Highway Bridge		x	14'-3"					
Pedestrian Bridge Overhead Sign		x	18'-0"					
Minimum Vertical Clearance (Arterial over Railroad)		x	9-4.0	Electrified: 22'-6" All Others: 20'-6"				

\* Controlling design criteria (see Section 6-6.0).

**Figure 4D**  
**RURAL COLLECTOR ROADS**  
**New Construction/Major Reconstruction**

Design Element			*	Manual Section	Design Values (by Type of Roadside Development)			
					Open	Moderate Density	High Density	
Design Controls	Typical Number of Access Points/Mile/Side			6-1.03	0 – 15	15 – 30	>30	
	Design Forecast Year			6-3.02	20 Years	20 Years	20 Years	
	Design Speed	AADT < 400	x	6-2.02	30 – 35 mph	N/A	N/A	
		AADT: 400 – 2000			35 – 50 mph	35 – 45 mph	N/A	
		AADT > 2000			50 mph	45 – 50 mph	35 – 45 mph	
	Control of Access			6-4.0	Control by Regulation	Control by Regulation	Control by Regulation	
	Level of Service			6-3.0	C – D	C – D	C – D	
Cross Section Elements	Travel Lane Width	AADT < 400	x	10-1.01	10’	N/A	N/A	
		AADT: 400 – 1500			11’ (V≥35); 10’ (V≤30)	11’ (V≥35); 10’ (V≤30)	N/A	
		AADT: 1500 – 2000			11’	11’	N/A	
		AADT > 2000			12’	12’	12’	
	Shoulder Width	AADT ≤ 1500	x	10-1.02	2’ – 8’	2’ – 8’	N/A	
		AADT > 1500			4’ – 8’	4’ – 8’	4’ – 8’	
	Typical Cross Slope	Travel Lane	x	10-1.01	1.5 – 2.0%	1.5 – 2.0%	1.5 – 2.0%	
		Shoulder	x	10-1.02	4%	Uncurbed: 4% Curbed: 6%	Uncurbed: 4% Curbed: 6%	
	Turn Lanes	Lane Width	x	10-1.03	1’ Less than Travel Lane Width — Same as Travel Lane			
		Shoulder Width	x		2’ – 4’			
	Bicycle Lane	Width		15-4.0	5’ or Shoulder Width, whichever is greater			
		Cross Slope			2%			
	Bridge Width/Cross Slope (1)			x	10-4.01	Meet Approach Roadway Width and Cross Slope	Sidewalk Width: 5’-6”	
	Underpass Width				10-4.02	Meet Approach Roadway Width Plus Clear Zones		
	Right-of-Way Width				10-5.0	Project-by-Project Basis		
	Roadside Clear Zones			x	13-2.0	See Section 13-2.0		
	Fill/Cut Slopes				10-2.02	See Figure 4G		

\* Controlling design criteria (see Section 6-6.0).

**Footnote:**

(1) Bridge Width. See Section 3-2.04 for local bridge projects.

**Figure 4D (Continued)**  
**RURAL COLLECTOR ROADS**  
**New Construction/Major Reconstruction**

Design Element			*	Manual Section	Design Values (Based on Design Speed)			
					50 mph	45 mph	35 mph	30 mph
Alignment Elements	Stopping Sight Distance		x	7-1.0	425'	360'	250'	200'
	Decision Sight Distance	Maneuver		7-2.0	750'	675'	525'	450'
		Stop			465'	395'	275'	220'
	Minimum Radius (e = 6.0%)		x	8-2.02	840'	665'	385'	275'
	Superelevation	e <sub>max</sub>		8-2.02	6.0%	6.0%	6.0%	6.0%
		Rate	x		See Figure 8-2A			
	Horizontal Sight Distance			8-2.04	See Section 8-2.04			
	Maximum Grade		x	9-2.03	7%	8%	8%	9%
	Minimum Grade			9-2.03	0.5%			
	Vertical Curvature (K-Value)	Crest		9-3.02	84	61	29	19
		Sag		9-3.03	96	79	49	37
	Minimum Vertical Clearance: Collector Under ...	New Highway Bridge	x	9-4.0	14'-6"			
		Existing Highway Bridge	x		14'-3"			
	Minimum Vertical Clearance (Collector over Railroad)		x	9-4.0	Electrified: 22'-6" All Others: 20'-6"			

\* Controlling design criteria (see Section 6-6.0).

**Figure 4E**  
**RURAL LOCAL ROADS**  
**New Construction/Major Construction**

Design Element			*	Manual Section	Design Values (by Type of Roadside Development)			
					Open	Moderate Density	High Density	
Design Controls	Typical Number of Access Points/Mile/Side			6-1.03	0 – 15	15 – 30	>30	
	Design Forecast Year			6-3.02	20 Years	20 Years	20 Years	
	Design Speed	AADT < 50	x	6-2.02	20 – 30 mph	N/A	N/A	
		AADT: ≥ 50			30 – 35 mph	30 – 35 mph	30 – 35 mph	
	Control of Access			6-4.0	Control by Regulation	Control by Regulation	Control by Regulation	
	Level of Service			6-3.0	C – D	C – D	C – D	
Cross Section Elements	Travel Lane Width	AADT < 400	x	10-1.01	9’ (V≤40); 10’ (V≥45)	N/A	N/A	
		AADT: 400 – 1500			10’ (V≤40); 11’ (V≥45)	10’ (V≤40); 11’ (V≥45)	N/A	
		AADT: 1500 – 2000			11’	11’	11’	
		AADT > 2000			12’	12’	12’	
	Shoulder Width		x	10-1.02	2’ – 4’	2’ – 4’	2’ – 4’	
	Typical Cross Slope	Travel Lane	x	10-1.01	1.5 – 2.0%	1.5 – 2.0%	1.5 – 2.0%	
		Shoulder (W < 4’)			Same as Adjacent Travel Lane			
		Shoulder (W ≥ 4’)	x	10-1.02	4%	Uncurbed: 4% Curbed: 6%	Uncurbed: 4% Curbed: 6%	
	Turn Lanes	Lane Width		10-1.03	1’ Less Than Travel Lane Width — Same as Travel Lane			
		Shoulder Width	x		2’ – 4’			
	Bicycle Lane	Width		15-4.0	5’ or Shoulder Width, whichever is greater			
		Cross Slope			2%			
	Bridge Width/Cross Slope (1)		x	10-4.01	Meet Approach Roadway Width and Cross Slope		Sidewalk Width: 5’-6”	
	Underpass Width			10-4.02	Meet Approach Roadway Width Plus Clear Zones			
	Right-of-Way Width			10-5.0	Project-by-Project Basis			
	Roadside Clear Zones		x	13-2.0	See Section 13-2.0			
	Fill/Cut Slopes			10-2.02	See Figure 4G			

\* Controlling design criteria (see Section 6-6.0).

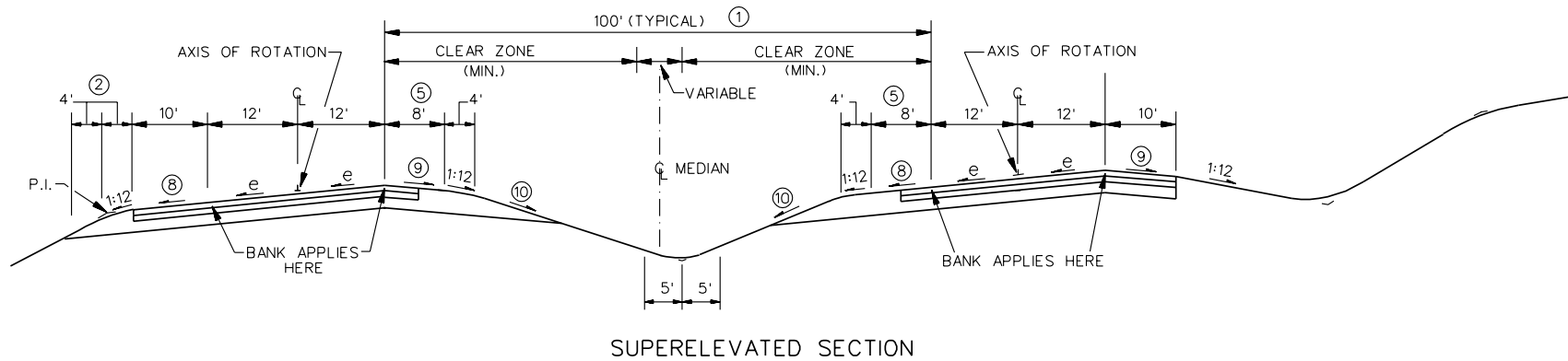
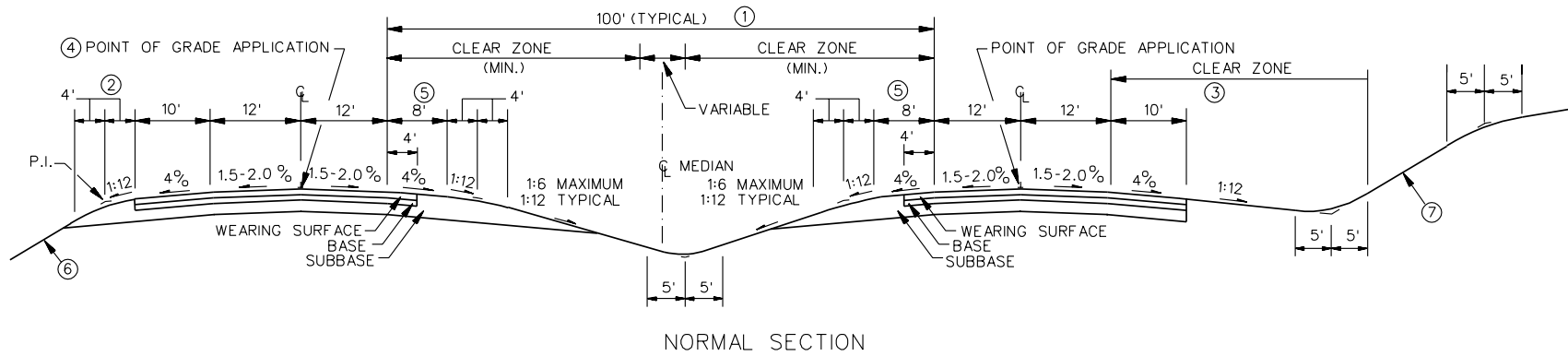
**Footnote:**

(1) Bridge Width. See Section 10-4.01 for additional information on minimum bridge widths. See Section 3-2.04 for local bridge projects.

**Figure 4E (Continued)**  
**RURAL LOCAL ROADS**  
**New Construction/Major Reconstruction**

Design Element			*	Manual Section	Design Values (Based on Design Speed)					
					45 mph	40 mph	35 mph	30 mph	25 mph	20 mph
Alignment Elements	Stopping Sight Distance		x	7-1.0	360'	305'	250'	200'	155'	115'
	Decision Sight Distance	Maneuver		7-2.0	675'	600'	525'	450'	N/A	N/A
		Stop			395'	330'	275'	220'		
	Minimum Radius (e = 6.0%)		x	8-2.02	665'	510'	385'	275'	190'	120'
	Superelevation	e <sub>max</sub>		8-2.02	6.0%	6.0%	6.0%	6.0%	6.0%	6.0%
		Rate	x		See Figure 8-2A					
	Horizontal Sight Distance			8-2.04	See Section 8-2.04					
	Maximum Grade		x	9-2.03	9%	10%	10%	10%	11%	11%
	Minimum Grade			9-2.03	0.5%					
	Vertical Curvature (K-Value)	Crest		9-3.02	61	44	29	19	12	7
		Sag		9-3.03	79	64	49	37	26	17
	Minimum Vertical Clearance: Local Road Under ...	New Highway Bridge	x	9-4.0	14'-6"					
		Existing Highway Bridge	x		14'-3"					
	Minimum Vertical Clearance (Local Road over Railroad)		x	9-4.0	Electrified: 22'-6" All Others: 20'-6"					

\* Controlling design criteria (see Section 6-6.0).



**TYPICAL DEPRESSED MEDIAN SECTION  
(Rural Freeways)**

**Figure 4F**

## TYPICAL DEPRESSED MEDIAN SECTION (Rural Freeways)

### Notes to Figure 4F

1. Median: This section will apply to all medians greater than 66 ft. See Figure 4I for median widths of 66 ft or less, which will warrant a median barrier.
2. Slope Rounding: This is the recommended treatment and, when used, the slope rounding should be 8 ft. This will apply to all conditions, except where the design speed is 70 mph and where an unprotected 1:4 slope is provided. In this case, the recommended rounding is 11 ft. Rounding is not necessary on fill slopes protected by guiderail. See Figure 4H for detail if guide rail is used.
3. Clear Zone: The outside limit of rounding for the backslope should be outside of the clear zone as determined by Section 13-2.0. If this is within the clear zone, the backslope should be safely traversable (See Figure 13-3D).
4. Point of Grade Application: The following criteria will apply:

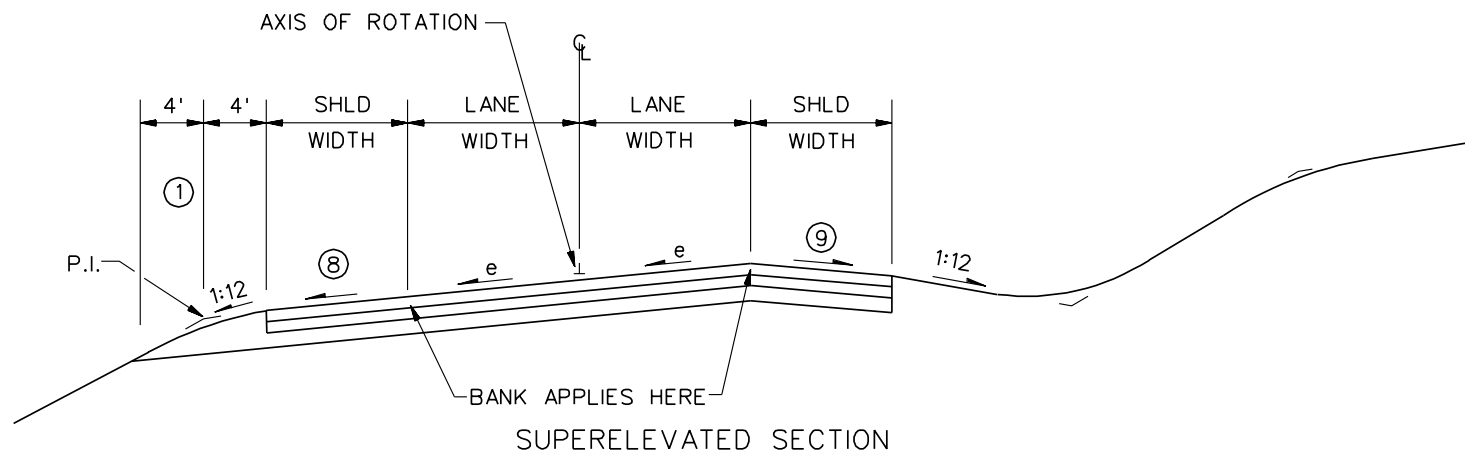
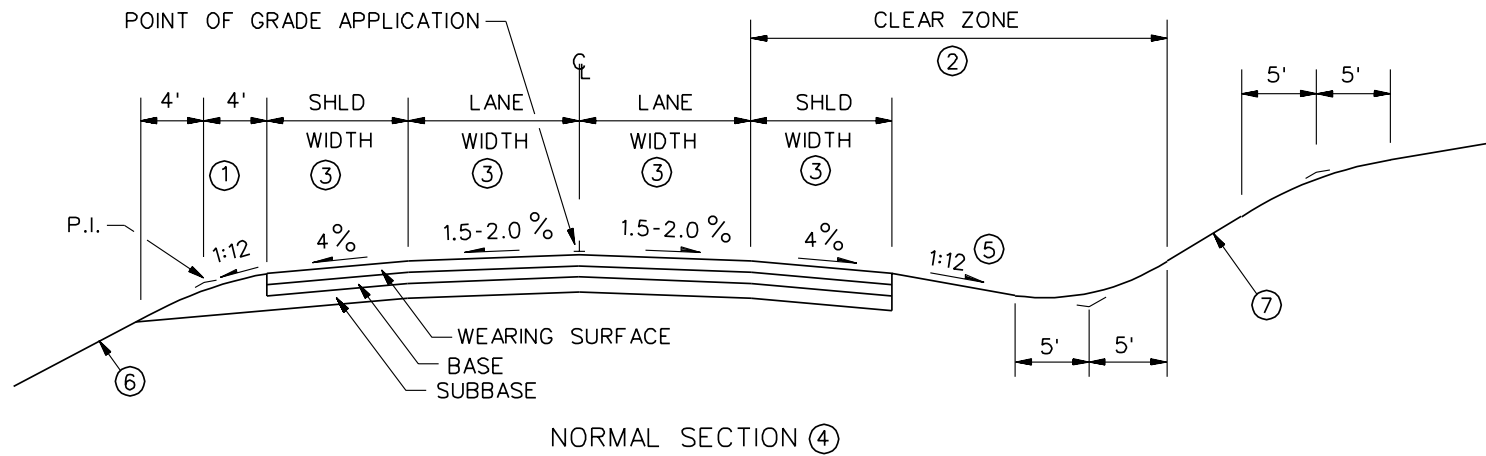
<u>Pavement Width</u>	<u>Point of Grade Application</u>
Two 12-ft lanes	12 ft from inside edge of traveled way
Three 12-ft lanes	12 ft from inside edge of traveled way
Four 12-ft lanes	24 ft from inside edge of traveled way

5. Left Shoulder: As indicated on the figure, the left shoulder is 8 ft graded with 4 ft paved. For three or more lanes in one direction, use a 10-ft paved left shoulder.
6. Fill Slope: These should be as flat as practical. Consider the following criteria:

<u>Fill Height</u>	<u>Fill Slope</u>	<u>Guiderail</u>
0 ft – 10 ft	1:6	No
10 ft – 25 ft	1:4	No
>25 ft	1:2	Yes

Also, see Figure 4H for treatment at bottom of fill slope and for guide rail placement on fill slopes.

7. Cut Slope: These should be as flat as practical, but should not exceed 1:2. Also see the clear zone discussion in Note #3. A uniform rate of slope should be maintained throughout a cut section. Where site conditions dictate a change from one rate of slope to another within a cut section, the length of transition will be as long as practical to effect a natural appearing contour. Figure 4J contains detailed information on earth and rock cuts.
8. Shoulder Superelevation (Low-Side): The slope of the shoulder should be 4% or "e", whichever is greater.
9. Shoulder Superelevation (High-Side): See Figure 4H for treatment of high-side shoulder. For the 8-ft shoulder (two lanes in one direction), use 8 ft when reading into the table in Figure 4H.
10. Median Slope: When the axis of rotation is at the centerline of the two roadways, a compensating median slope must be used on a superelevated section, or independent profiles must be used.
11. Stage Construction: When Stage Construction requires excavation for future lanes, the extent and details of grading and drainage will be determined during design of initial construction. Where rock is encountered, it will be removed in the initial construction as necessary to preclude subsequent operational interference.



**TYPICAL TWO-LANE SECTION**  
**(Rural Arterial/Collector/Local Roads)**

**Figure 4G**



## TYPICAL TWO-LANE SECTION (Rural Arterial/Collector/Local Roads)

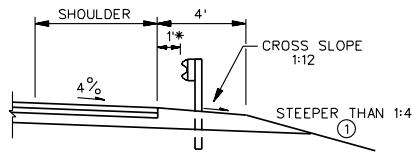
### Notes to Figure 4G

1. Slope Rounding: This is the recommended treatment and, when used, the slope rounding should be 8 ft. Rounding is not necessary on fill slopes protected by guiderail. See Figure 4H for detail if guiderail is used.
2. Clear Zone: The outside limit of rounding for the backslope should be outside of the clear zone as determined by Section 13-2.0. If this is within the clear zone, the backslope should be safely traversable (see Figure 13-3D).
3. Lane and Shoulder Width: See Figures 4C, 4D and 4E for criteria on lane and shoulder width.
4. Curb Sections: If curbing is required for drainage, see Figure 5I for typical section.
5. Sidewalks: See Figure 4H for typical treatment of sidewalks, if warranted.
6. Fill Slope: These should be as flat as practical. Consider the following criteria:

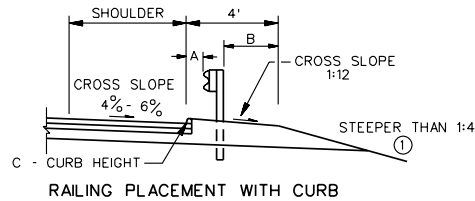
<u>Fill Height</u>	<u>Fill Slope</u>	<u>Guiderail</u>
0.0 ft – 10 ft	1:6	No
10 ft – 25 ft	1:4	No
> 25 ft	1:2	Yes

Also, see Figure 4H for treatment at bottom of fill slope. If a curb is used, see Figure 4H for treatment of guiderail and curb used in combination.

7. Cut Slope: These should be as flat as practical, but should not exceed 1:2. Also, see the clear zone discussion in Note #2. A uniform rate of slope should be maintained throughout a cut section. Where site conditions dictate a change from one rate of slope to another within a cut section, the length of transition will be as long as practical to effect a natural appearing contour. Figure 4J contains detailed information on earth and rock cuts.
8. Shoulder Superelevation (Low-Side): The slope of the shoulder should be 4% or "e", whichever is greater.
9. Shoulder Superelevation (High-Side): See Figure 4H for treatment of high-side shoulder.



\*TYPICAL OR FLUSH WITH EDGE OF PAVEMENT  
RAILING PLACEMENT WITHOUT CURB

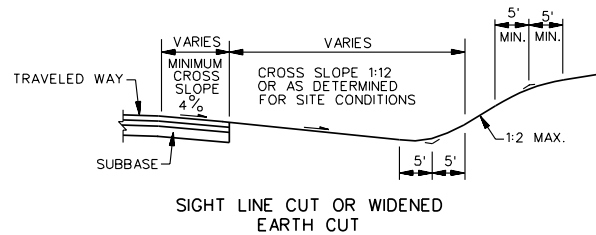


RAILING PLACEMENT WITH CURB

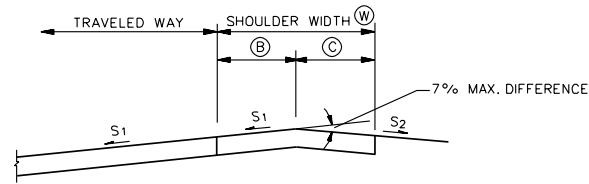
TYPE OF GUIDERAIL	A	B (MINIMUM)	C (MAXIMUM)
METAL BEAM RAIL (TYPE R-B 350)			
LOW SPEED ( $V < 50$ mph)	9"	24"	6"
HIGH SPEED ( $V \geq 50$ mph)	0	24"	4"
THREE-CABLE GUIDERAILING (I-BEAM POST)	12" MAX.	24"	*

① USE METAL BEAM RAIL (TYPE R-B 350) OR THREE-CABLE GUIDERAILING (I-BEAM POSTS) ON FILL SLOPES STEEPER THAN 1:4 WITH CURBING. GUIDERAIL MAY ALSO BE REQUIRED WHERE ROADSIDE HAZARDS ARE LOCATED WITHIN ROADSIDE CLEAR ZONE. SEE CHAPTER THIRTEEN.

\* CURBING, WHERE USED IN CONJUNCTION WITH THREE-CABLE GUIDERAILING ON HIGH-SPEED ROADWAYS ( $V \geq 50$  mph), SHALL BE 4" MAX. IN HEIGHT.



SIGHT LINE CUT OR WIDENED  
EARTH CUT

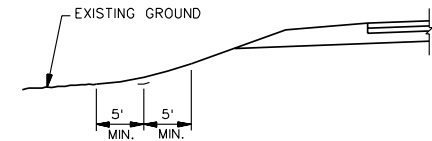


W	B	C
< 4'	0' TO 4'	0'
4' TO < 8'	0' TO 4'	4'
≥ 8'	0'	≥ 8'

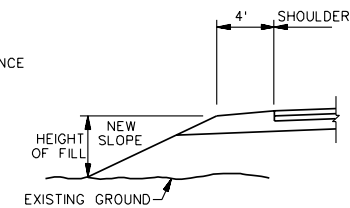
GENERAL NOTES:

- MAY REQUIRE ATTACHABLE EXTENSIONS OR CUT-OFF PLATES ON PAVING EQUIPMENT.
- WHERE  $S_2$  IS FLATTER THAN 2%, THE CONTRACTOR SHALL VERIFY THE CROSS SLOPE AT EACH 25' INTERVAL (PAYMENT TO BE INCLUDED IN THE COST OF THE BITUMINOUS CONCRETE PAY ITEM - THERE WILL BE NO DIRECT PAYMENT.)
- $S_2$  SHALL BE 1% MINIMUM.
- DO NOT PROVIDE CURBING ON 4' SHOULDERS WITH SUPERELEVATION  $> 4\%$ .
- ALL OTHER TREATMENTS TO BE USED ONLY WITH PRIOR APPROVAL FROM THE HYDRAULICS AND DRAINAGE, DESIGN DEVELOPMENT TEAM AND PAVEMENT MANAGEMENT UNIT.
- INCLUDE NOTE 1 ON ALL CONTRACT DRAWINGS. INCLUDE NOTE 2 ON ALL CONTRACT DRAWINGS WHERE THE SUPERELEVATION RATES ARE STEEPER THAN 4%.

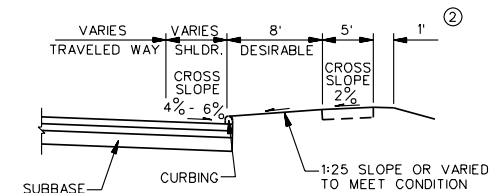
SHOULDER TREATMENT HIGH SIDE OF BANK



TREATMENT AT BOTTOM OF FILL SLOPES



METHOD OF DETERMINING HEIGHT OF FILL  
AS RELATED TO SIDE SLOPE DESIGN

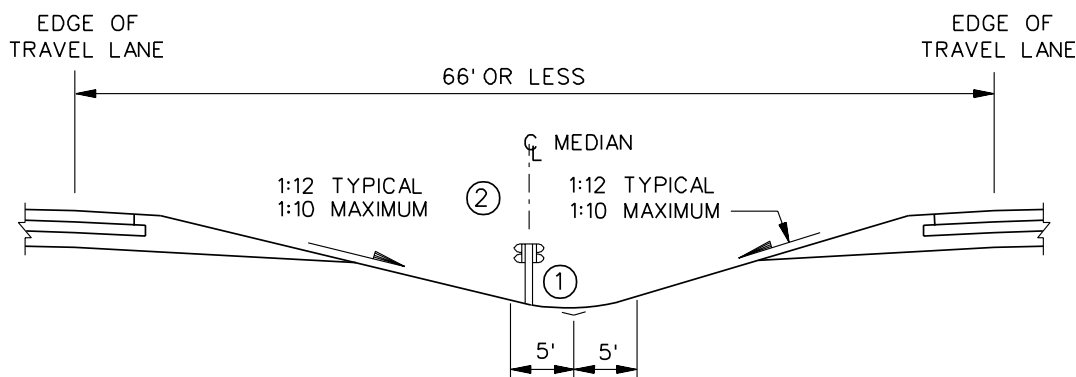


CURB AND WALK AREA

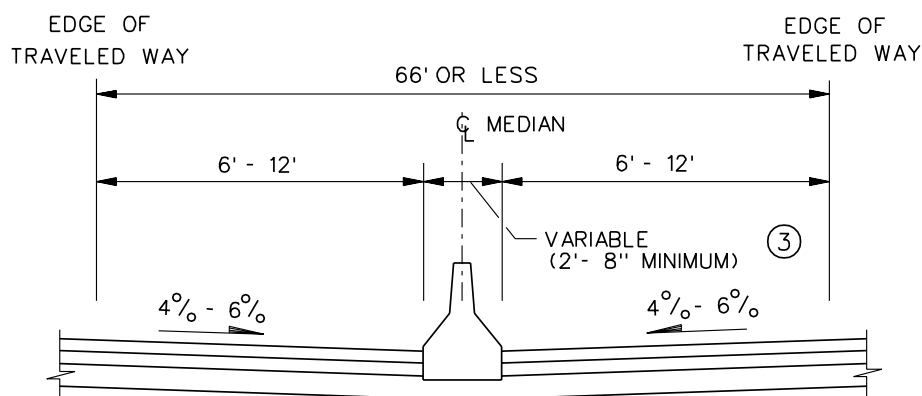
② IF GUIDERAIL IS REQUIRED, IT WILL BE PLACED BEYOND SIDEWALK. THEREFORE, THIS DIMENSION WILL BE INCREASED AS NECESSARY TO ALLOW FOR PROPER GUIDERAIL PLACEMENT.

## MISCELLANEOUS DETAILS VARIOUS CLASSES

Figure 4H



TYPICAL DEPRESSED MEDIAN  
(With Metal-Beam Barrier)

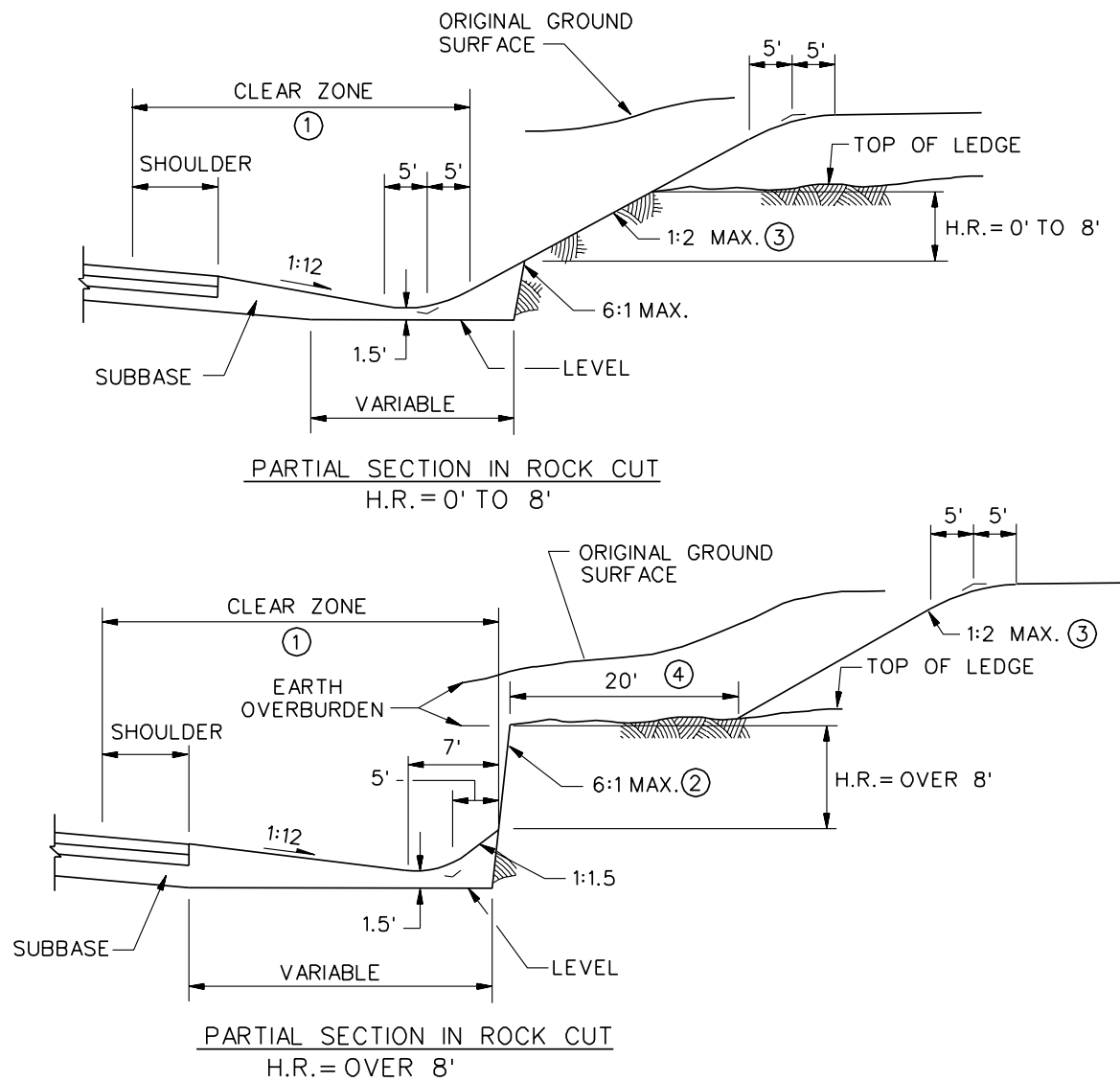


TYPICAL MEDIAN  
(With Concrete Median Barrier)

1. Placement of Median Barrier: The preferred location of the median barrier is in the center of the median. This will require that the drainage system be offset from the center as indicated in the figure.
2. Median Slope on Superelevated Sections: The designer must ensure that the slope leading up to the median barrier does not exceed 1:10. This may require the use of independent profiles for the two roadways. Another option is to place the barrier near the edge of the shoulder; however, this is undesirable and should be avoided.
3. CMB Width: Consider providing a 8'-4" wide CMB to accommodate bridge piers for overpassing structures or other appurtenances in the median.

### TYPICAL MEDIAN SECTION FOR FREEWAYS (66 ft or Less)

Figure 4I



DETAILS OF CUT SECTIONS

Figure 4J